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## **Wed-Mo-Or3-04: THEVA - High-Performance REBCO HTS tapes for high-field applications: advancements in medical imaging and fusion energy.**

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High-temperature superconducting (HTS) REBCO tapes are being developed for practical use in high-field applications such as medical imaging and nuclear fusion. These tapes achieve current densities exceeding  $800 \text{ A/mm}^2$  at 20 K and 20 T, made possible by incorporating artificial pinning (AP) particles that enhance their magnetic field resilience and overall performance. Mechanical stability is also a crucial focus in our development, as the tapes must withstand the strong forces encountered in high-field magnets, ensuring that they maintain performance and reliability.

In the Filaments4Fusion project, the focus was on developing REBCO tapes with reduced AC losses, enhancing their performance for fusion magnets. Within the new HTS4Fusion project THEVA is developing JANUS wire, i.e. assembled HTS-wires with broad, angular symmetric critical current distribution offering a wide tolerance margin for use in fusion magnets.

The REBCO tapes are being integrated into advanced medical imaging systems to meet the increasing demand for high-field magnets in healthcare. Ongoing collaborations with medical technology partners demonstrate their potential in next-generation MRI systems, including a 14T full-body scanner.

Key findings from the SuperEMFL project, aimed at achieving 40+ T all-superconducting user magnets, include successful testing of the tapes under extreme conditions. The tapes were tested in stacked coil configurations, demonstrating excellent winding ability and mechanical stability under high magnetic fields

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